Name:

at1118paper: Complete the Square (v420)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 60x = -576$$

Add $\left(\frac{-60}{2}\right)^2$, which equals 900, to both sides of the equation.

$$x^2 - 60x + 900 = 324$$

Factor the left side.

$$(x - 30)^2 = 324$$

Undo the squaring. We need to consider both $\pm\sqrt{324}$.

$$x - 30 = -18 \quad \text{or} \quad x - 30 = 18$$
$$x = 12 \quad \text{or} \quad x = 48$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 - 32x = -240$$

$$x^2 - 32x + 256 = 16$$
$$(x - 16)^2 = 16$$
$$x - 16 = \pm 4$$
$$x = 12 \quad \text{or} \quad x = 20$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 + 46x = -273$$

$$x^2 + 46x + 529 = 256$$
$$(x + 23)^2 = 256$$
$$x + 23 = \pm 16$$
$$x = -39 \quad \text{or} \quad x = -7$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 - 46x = 627$$

$$x^2 - 46x + 529 = 1156$$
$$(x - 23)^2 = 1156$$
$$x - 23 = \pm 34$$
$$x = -11 \quad \text{or} \quad x = 57$$

Question 4

By completing the square, find both solutions to the given equation:

$$x^2 - 18x = 88$$

$$x^2 - 18x + 81 = 169$$
$$(x - 9)^2 = 169$$
$$x - 9 = \pm 13$$
$$x = -4 \quad \text{or} \quad x = 22$$

Question 5

By completing the square, find both solutions to the given equation:

$$x^2 + 18x = 1008$$

$$x^2 + 18x + 81 = 1089$$
$$(x + 9)^2 = 1089$$
$$x + 9 = \pm 33$$
$$x = -42 \quad \text{or} \quad x = 24$$

Question 6

By completing the square, find both solutions to the given equation:

$$x^2 + 30x = -104$$

$$x^2 + 30x + 225 = 121$$
$$(x + 15)^2 = 121$$
$$x + 15 = \pm 11$$
$$x = -26 \quad \text{or} \quad x = -4$$